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CRYPTOCURRENCY: CORRELATION ANALYSIS

***Аннотация:** В этой статье обсуждены значение криптовалюты и ее корреляционного анализа. Криптовалюты представлены огромным числом цифровых валют, которые имеют между собой как схожести, так различия. Тем не менее, огромный ажиотаж, который вызван внедрением новых электронных денег во все сферы экономики, в особенности банковский сектор привел к огромному спросу, а также к высоким темпам роста курса. Сейчас же не только опытные инвесторы активно инвестируют в эту сферу, но и простые граждане, которые могут ежедневно наблюдать, что Биткоин обновил очередной максимум и опять вырос в цене.*

Однако инвестирование довольно сложная наука, поэтому очень важно составить свой портфель таким образом, чтобы в случае внезапных изменений рынка не потерять все накопленное непосильным трудом.

***Ключевые слова:** криптовалюта, цифровая валюта, токены, крипторынок, корреляция.*

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Annotation: *In this article are discussed the value of cryptocurrency and its correlation analysis. Cryptocurrencies are presented by huge number of digital currencies, which have among themselves as similarity, and cardinally differ from each other. Nevertheless, a huge agiotage which caused by daily introduction of new electronic money to all spheres of economy, and especially banking sector has resulted in huge demand and as a result there are an incredible growth rates. Now not only far-sighted investors actively invest in this sphere, but also ordinary citizens who can daily observe that the Bitcoin has updated the next maximum and has again grown in price.*

However, investment is quite difficult science therefore, it is very important to make the portfolio so that in case of sudden changes of the market not to lose everything saved up by backbreaking toil. One of such factors influencing stability of the investment portfolio is the correlation.

Keywords: *cryptocurrency, digital currency, tokens, cryptomarket, correlation.*

Bitcoin began operating in January 2009 and is the first decentralised cryptocurrency, with the second cryptocurrency, Namecoin, not emerging until more than two years later in April 2011. Today, there are hundreds of cryptocurrencies with market value that are being traded, and thousands of cryptocurrencies that have existed at some point. [1]

The common element of these different cryptocurrency systems is the public ledger ('blockchain') that is shared between network participants and the use of native tokens as a way to incentivize participants for running the network in the absence of a central authority. However, there are significant differences between some cryptocurrencies concerning the level of innovation displayed (Figure 1).

The majority of cryptocurrencies are largely clones of bitcoin or other cryptocurrencies and simply feature different parameter values (e.g., different

block time, currency supply, and issuance scheme). These cryptocurrencies show little to no innovation and are often referred to as 'altcoins'. Examples include Dogecoin and Ethereum Classic.

It is not a secret that between price fluctuations of many cryptocurrency couples there is a direct connection, which is noticeable. In certain time points, the cost of one asset can change the value in proportion to change of another, it is quite often possible to observe also the return process. To reveal these dependences it is necessary to enter such term as correlation.[2]



Generally, the correlation is statistical interrelation of two and more random variables. In a case, temporary ranks of average cost of an asset perform with cryptocurrencies as these sizes. Below the blue arrow shows the site of the "return" correlation at which the cost of assets moves in "opposite directions", the red arrow indicate - the site of strong "positive" correlation.

Depending on the mutual movement of cost of currencies, the correlation can be classified as direct, or the return. At direct correlation, the cost of one asset moves in the same direction, as the cost of the correlating currency. At the return correlation as it is possible to understand from the name, there is the return process. I.e. with a growth of cost of one asset, the price of another falls.

Correlation explains how much two variables are related. A correlation of 100% would mean that the positive change in one variable is perfectly related to the positive change in the other variable. [3]

If the correlation between cryptocurrency value and exchange listings was 100%, then it would possible to observe an exactly proportional increase in market capitalization with an increase in the number of exchange listings.

Since the correlation is over 50%, it might be tempting to list on as many exchanges as possible to maximize token value. Do not be tempted. Even though market capitalization and the exchange listings are somewhat linearly correlated, it does not mean that listing on more exchanges definitely results in an increase in market capitalization. Especially when a little more analysis reveals the presence of major outliers.

Table 1.

Cryptocurrency Correlation Matrix, 90-days

	BTC	ETH	XRP	BCH	XML	LTC	XEM	DASH	XMR	ETC	LSK	ZEC	SC	REP	FCT	NXT	S&P 500	VIX	GLD
BTC	1																		
ETH	0,5	1																	
XRP	0,24	0,47	1																
BCH	0,18	0,46	0,14	1															
XML	0,53	0,48	0,56	0,13	1														
LTC	0,57	0,74	0,37	0,34	0,42	1													
XEM	0,48	0,63	0,53	0,32	0,52	0,61	1												
DASH	0,45	0,65	0,29	0,64	0,39	0,6	0,53	1											
XMR	0,6	0,69	0,32	0,54	0,57	0,62	0,57	0,76	1										
ETC	0,43	0,73	0,23	0,47	0,57	0,51	0,53	0,65	0,65	1									
LSK	0,51	0,58	0,42	0,19	0,44	0,49	0,5	0,52	0,59	0,44	1								
ZEC	0,43	0,79	0,48	0,52	0,52	0,65	0,59	0,74	0,35	0,66	0,73	1							
SC	0,43	0,49	0,36	0,37	0,45	0,47	0,51	0,58	0,81	0,39	0,58	0,6	1						
REP	0,36	0,63	0,26	0,44	0,3	0,47	0,47	0,56	0,57	0,51	0,48	0,6	0,45	1					
FCT	0,49	0,7	0,44	0,42	0,59	0,55	0,55	0,65	0,65	0,66	0,67	0,79	0,58	0,56	1				
NXT	0,47	0,31	0,4	0,23	0,3	0,39	0,39	0,38	0,38	0,31	0,38	0,39	0,49	0,32	0,35	1			
S&P 500	0,01	0,16	0,16	0,25	-0,25	0,02	0,05	-0,09	-0,09	-0,1	0,06	0,16	0,08	0,13	0,17	0,03	1		
VIX	-0,3	0,08	0,05	0,05	-0,05	0,12	-0,17	-0,06	-0,06	0,12	0,07	0,07	-0,1	0,01	0,05	0,17	0,55	1	
GLD	-0,1	0,13	0,08	0,02	0,08	0,04	0,03	0,04	0,05	0,09	0,07	0,11	0,12	0,14	0,01	0,06	0,01	0,03	1

From the table it is possible to draw several important conclusions.

First of all, practically all cryptocurrencies have among themselves the positive correlation. It means, that the cryptomarket in general reacts to the same factors, the general capitalization of the cryptomarket fluctuates concerning some external factors, cryptocurrencies, in general, move synchronously.

Of course, communication between separate currencies is somewhere higher, somewhere below. For example, between two most popular currencies with the highest capitalization, Ethirium and Bitcoin, on a 90-day segment the correlation is equal 0.5, in general there is a quite good compliance between movements of these currencies. There is also more strong dependence, say, between Bitcoin and Monero the coefficient is equal 0.6, and between Zcash and Monero 0.81 at all, that is these two coins move almost synchronously.

Secondly, this more important observation, the cryptomarket in general has the return correlation to several known fundamental indicators. Apparently, from

the schedule, the cryptomarket has negative dependence on the American stock market of S&P500 and on the index of volatility of VIX estimating tendency of investors to risk. At the same time with gold dependence poorly positive.[4]

It is possible to draw a conclusion that the cryptomarket experiences inflow of the capital when in the market escape from risk prevails, and decreases when interest in risk grows. So far this dependence is poorly expressed, but it exists, and it can be used for forecasting of interest in cryptocurrencies.[4]

Table 2

Correlation analysis Matrix of Bitcoin and Developed Countries

	bitcoin/USD	GDP China	GDP Japan	GDP USA	GDP UK
bitcoin/USD	1	-0,195	0,05	0,11	-0,08
GDP China	-0,195	1	-0,27	-0,11	-0,07
GDP Japan	0,05	-0,27	1	-0,06	-0,099
GDP USA	0,11	-0,11	-0,06	1	-0,006
GDP UK	-0,08	-0,07	-0,099	-0,006	1

According to my correlation analysis, it is possible to make several conclusions:

1. China. More and more actions are carried out which complicate promoting of digital currencies. At first the authorities of the country banned ICO, then banks have frozen the accounts concerning cryptocurrency exchanges and, eventually, Internet access to everything that is connected with trade in digital currency has been forbidden. All this has led to the fact that the largest in the world cryptocurrency exchanges have suffered losses. Besides, these exchanges miners had to change location. All in all, China became the most severe regulator of digital currencies.

2. Japan. Though in Japan digital money was widely adopted, this country can't be considered undemanding in questions of regulation. Attracting to itself all the best of the cryptocurrency industry, Japan just advances China and South

Korea. Without any doubt, Japan treats cryptocurrency with much bigger friendliness, than China.

3. USA. At the moment the USA hasn't defined yet how to treat regulation of cryptocurrencies. The U.S. Securities and Exchange Commission (SEC) warns people against investment into cryptocurrency, forbids some ICO and speaks about more serious regulation of cryptocurrencies. Commodity Futures Trading Commission (CFTC) was the first regulator in America, which has allowed trading in cryptocurrency derivatives publicly.

4. UK. While, the EU and Great Britain have to separate from each other, in questions of regulation of cryptocurrencies they have the similar points of view. On December 4, 2017 in The Guardian and The Telegraph, it was reported that the Ministry of Finance of Great Britain and the European Union intend to put the end of anonymities of cryptocurrency traders.

To sum up, the ICO is becoming an increasingly popular fundraising vehicle. Traditional businesses are starting to look to this crowd funding mechanism and bypassing other traditional forms of financing. [5]

Nonetheless, planning an initial coin offering requires a lot of thought and thorough research. Even deciding which exchanges to list on and how many exchanges to list on requires careful research. Fortunately, there are already hundreds of cryptocurrencies out there that can help to determine if it is worth the time and effort to pursue a certain strategy.

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